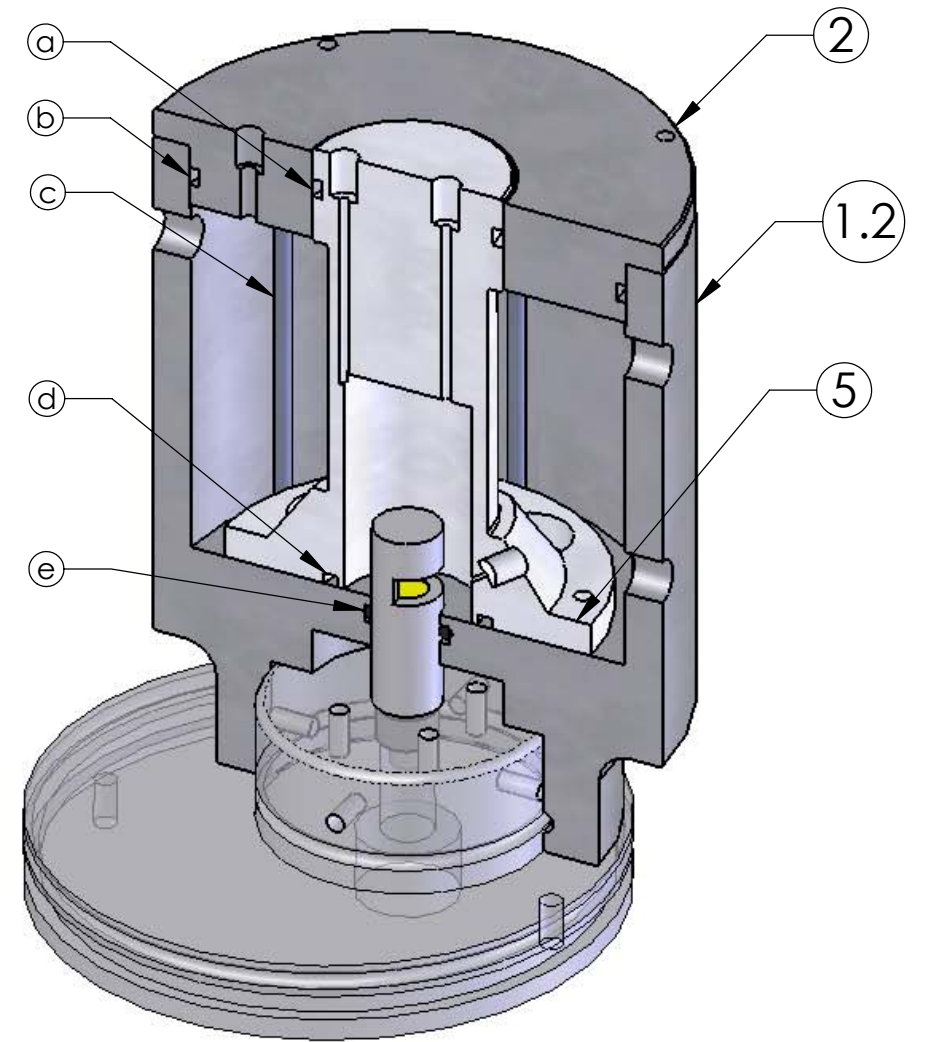




Large Volume Flowcell  
(20 ml)

Sample Outlet

3X 1/8" NPT

Sample Inlet

Coolant Path

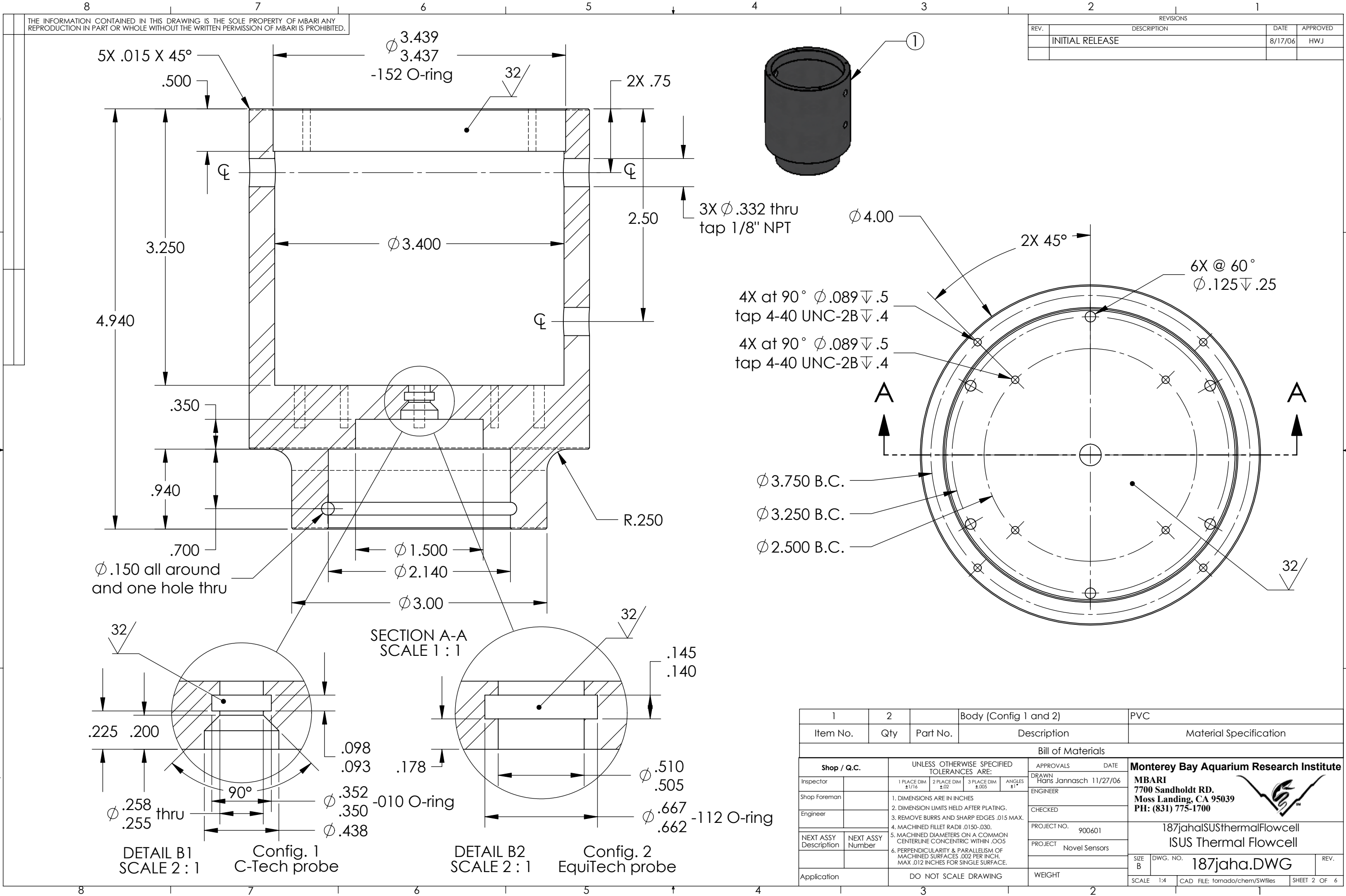
1/4-28 Upchurch

6 1 5 1 4

| 5        | 1   |          | Flowcell #1 (large volume) | PEEK                   |
|----------|-----|----------|----------------------------|------------------------|
| 4        | 1   |          | Flowcell #2 (with mixer)   | PEEK                   |
| 3        | 1   |          | Flowcell #1 (low volume)   | PEEK                   |
| 2        | 2   |          | Cap                        | PVC                    |
| 1        | 2   |          | Body (Config 1 and 2)      | PVC                    |
| Item No. | Qty | Part No. | Description                | Material Specification |

| Bill of Materials     |                  |                                                                                                                                                                                  |                     |                      |               |
|-----------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------|---------------|
| Shop / Q.C.           |                  | UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:                                                                                                                                       |                     | APPROVALS            | DATE          |
| Inspector             |                  | 1 PLACE DIM<br>±1/16                                                                                                                                                             | 2 PLACE DIM<br>±.02 | 3 PLACE DIM<br>±.005 | ANGLES<br>±1° |
| Shop Foreman          |                  | 1. DIMENSIONS ARE IN INCHES<br>2. DIMENSION LIMITS HELD AFTER PLATING.<br>3. REMOVE BURRS AND SHARP EDGES .015 MAX.<br>4. MACHINED FILLET RADII .0150-.030.                      |                     |                      |               |
| Engineer              |                  |                                                                                                                                                                                  |                     |                      |               |
| NEXT ASSY Description | NEXT ASSY Number | 5. MACHINED DIAMETERS ON A COMMON CENTERLINE CONCENTRIC WITHIN .005<br>6. PERPENDICULARITY & PARALLELISM OF MACHINED SURFACES .002 PER INCH. MAX .012 INCHES FOR SINGLE SURFACE. |                     |                      |               |
| Application           |                  | DO NOT SCALE DRAWING                                                                                                                                                             |                     | WEIGHT               |               |

|                                                                                                                                                            |                                |                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|---------------------------------------------------------------------------------------|
| <b>Monterey Bay Aquarium Research Institute</b><br><b>MBARI</b><br><b>7700 Sandholdt RD.</b><br><b>Moss Landing, CA 95039</b><br><b>PH: (831) 775-1700</b> |                                |  |
| 187jahaISUSthermalFlowcell<br>ISUS Thermal Flowcell                                                                                                        |                                |                                                                                       |
| SIZE<br>B                                                                                                                                                  | DWG. NO.<br>187jaha.DWG        | REV.                                                                                  |
| SCALE 1:4                                                                                                                                                  | CAD FILE: tornado/chem/SWfiles | SHEET 1 OF 6                                                                          |



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| REVISIONS |                 |         |          |
|-----------|-----------------|---------|----------|
| REV.      | DESCRIPTION     | DATE    | APPROVED |
|           | INITIAL RELEASE | 8/17/06 | HWJ      |
|           |                 |         |          |

|                       |                  |                                                                                                                                                                                                                                                                                                                                                 |                     |                       |               |                                                                 |  |
|-----------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------------|---------------|-----------------------------------------------------------------|--|
| 1                     |                  | 2                                                                                                                                                                                                                                                                                                                                               |                     | Body (Config 1 and 2) |               | PVC                                                             |  |
| Item No.              |                  | Qty                                                                                                                                                                                                                                                                                                                                             | Part No.            | Description           |               | Material Specification                                          |  |
| Bill of Materials     |                  |                                                                                                                                                                                                                                                                                                                                                 |                     |                       |               |                                                                 |  |
| Shop / Q.C.           |                  | UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:                                                                                                                                                                                                                                                                                                      |                     |                       |               | APPROVALS      DATE                                             |  |
| Inspector             |                  | 1 PLACE DIM<br>±1/16                                                                                                                                                                                                                                                                                                                            | 2 PLACE DIM<br>±.02 | 3 PLACE DIM<br>±.005  | ANGLES<br>±1° | DRAWN<br>Hans Jannasch 11/27/06                                 |  |
| Shop Foreman          |                  | 1. DIMENSIONS ARE IN INCHES<br>2. DIMENSION LIMITS HELD AFTER PLATING.<br>3. REMOVE BURRS AND SHARP EDGES .015 MAX.<br>4. MACHINED FILLET RADII .0150-.030.<br>5. MACHINED DIAMETERS ON A COMMON CENTERLINE CONCENTRIC WITHIN .005<br>6. PERPENDICULARITY & PARALLELISM OF MACHINED SURFACES .002 PER INCH. MAX .012 INCHES FOR SINGLE SURFACE. |                     |                       |               | ENGINEER                                                        |  |
| Engineer              |                  |                                                                                                                                                                                                                                                                                                                                                 |                     |                       |               | CHECKED                                                         |  |
| NEXT ASSY Description | NEXT ASSY Number |                                                                                                                                                                                                                                                                                                                                                 |                     |                       |               | PROJECT NO.      900601                                         |  |
|                       |                  |                                                                                                                                                                                                                                                                                                                                                 |                     |                       |               | PROJECT      Novel Sensors                                      |  |
| Application           |                  | DO NOT SCALE DRAWING                                                                                                                                                                                                                                                                                                                            |                     | WEIGHT                |               | SIZE B      DWG. NO.      REV.                                  |  |
|                       |                  |                                                                                                                                                                                                                                                                                                                                                 |                     |                       |               | 187jaha.DWG                                                     |  |
|                       |                  |                                                                                                                                                                                                                                                                                                                                                 |                     |                       |               | SCALE 1:4      CAD FILE: tornado/chem/SWfiles      SHEET 2 OF 6 |  |

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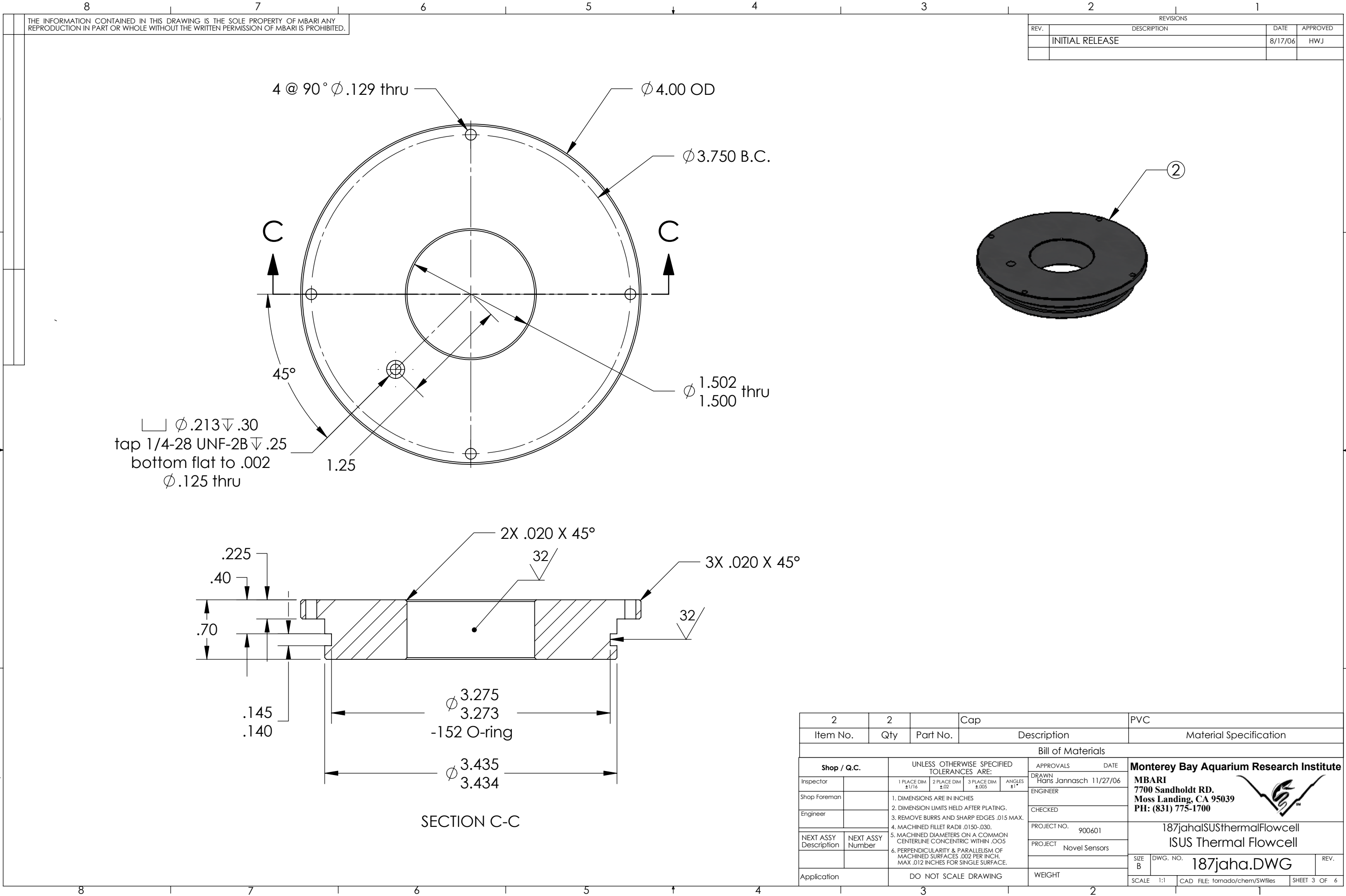
Moss Landing, CA 95039

PH: (831) 775-1700



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MBARI  
7700 Sandholdt RD.  
Moss Landing, CA 95039  
PH: (831) 775-1700

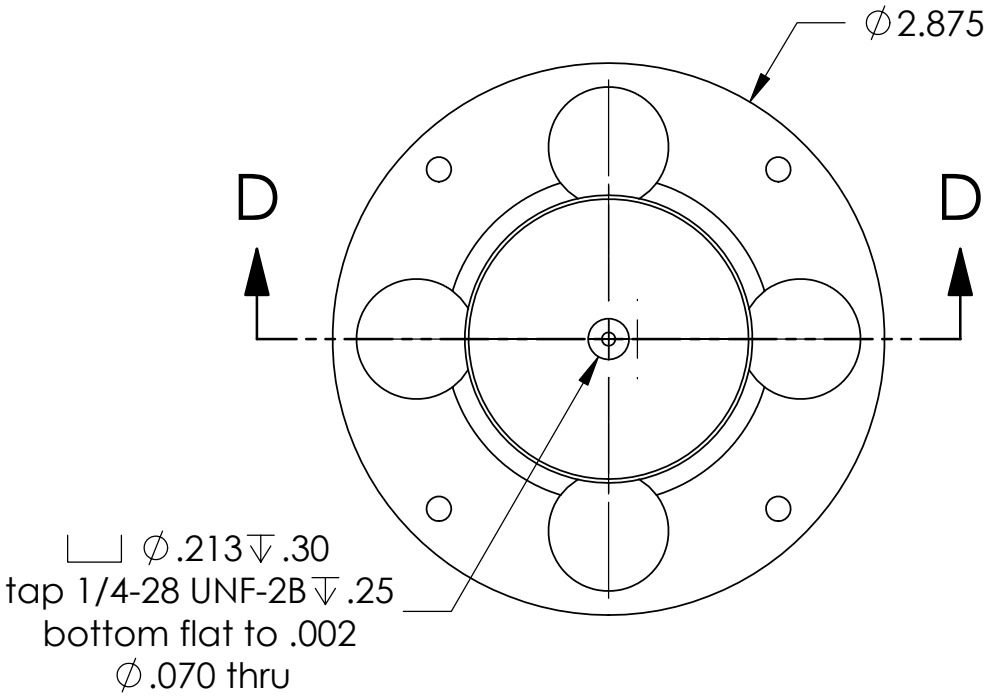
187jahaUSthermalFlowcell  
ISUS Thermal Flowcell



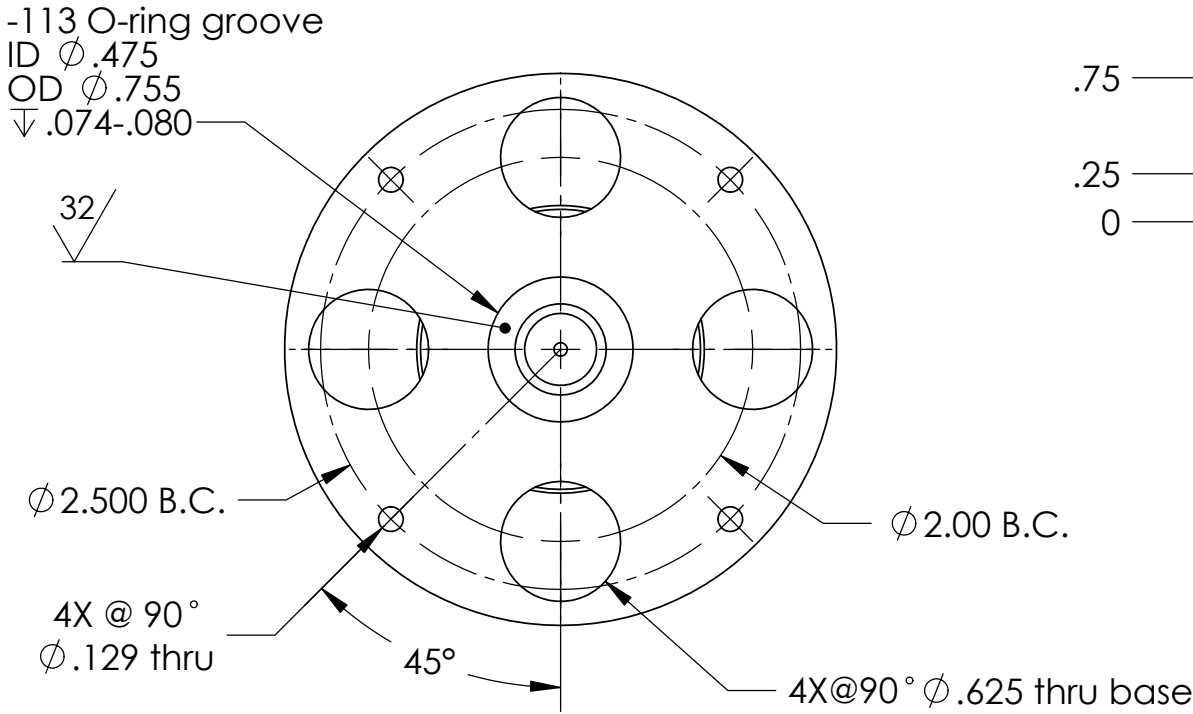


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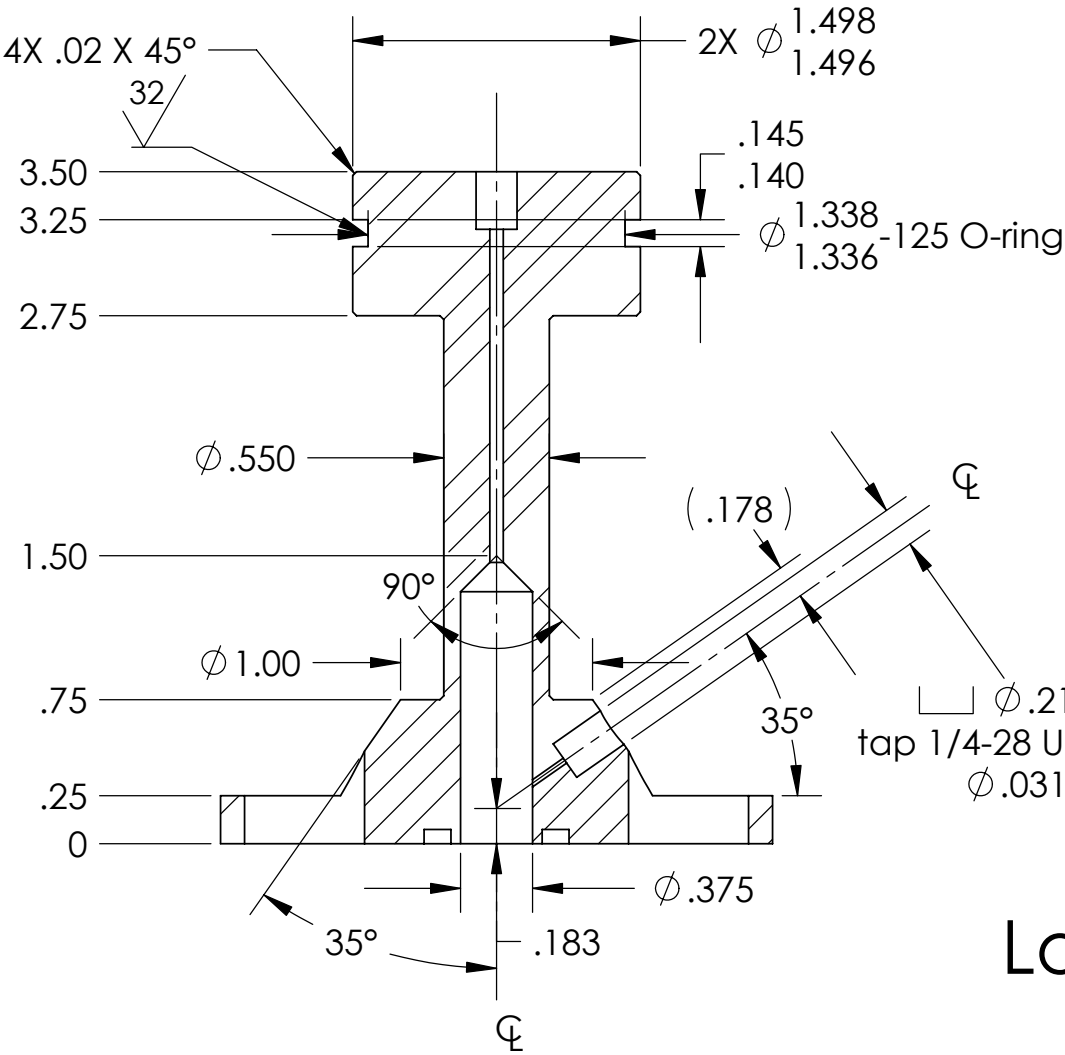
| REVISIONS |                 |         |          |
|-----------|-----------------|---------|----------|
| REV.      | DESCRIPTION     | DATE    | APPROVED |
|           | INITIAL RELEASE | 8/17/06 | HWJ      |
|           |                 |         |          |



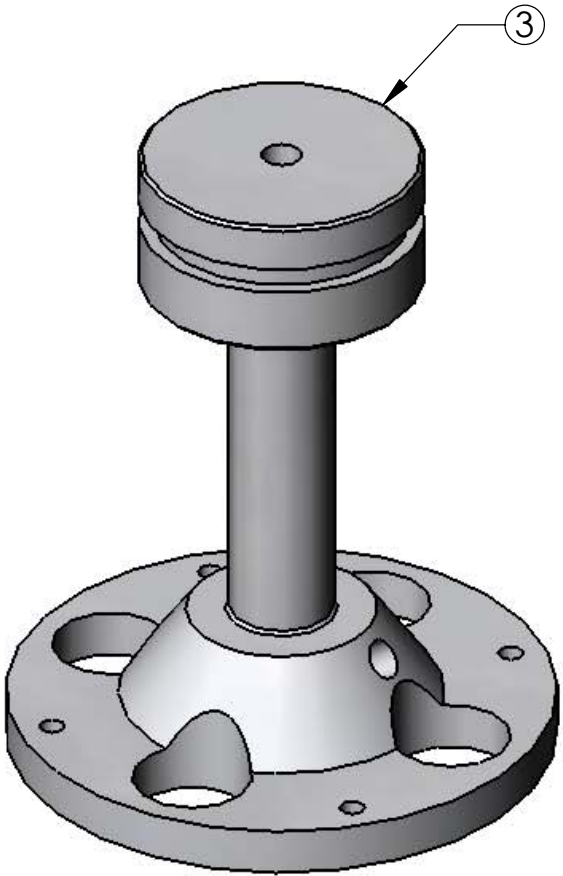
Top View



Bottom View

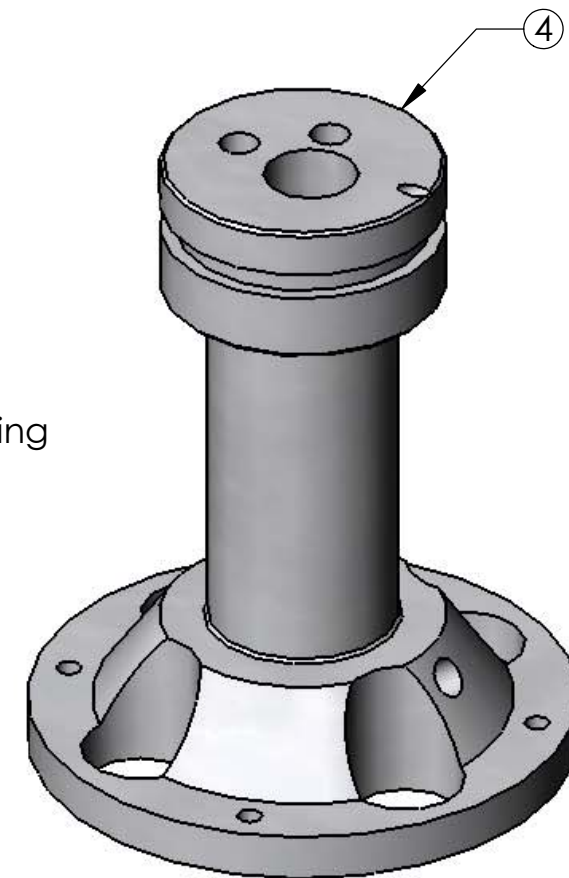
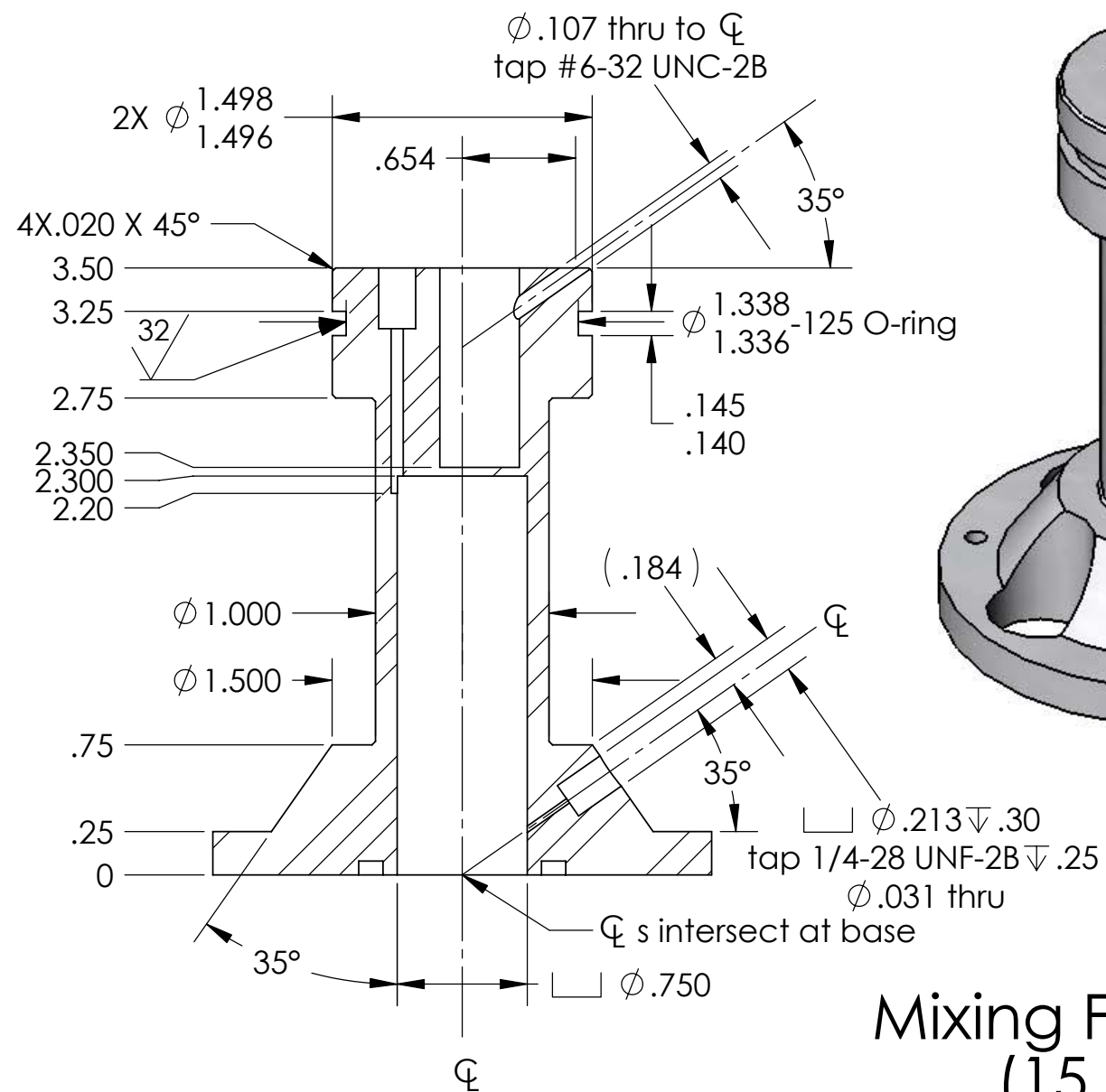
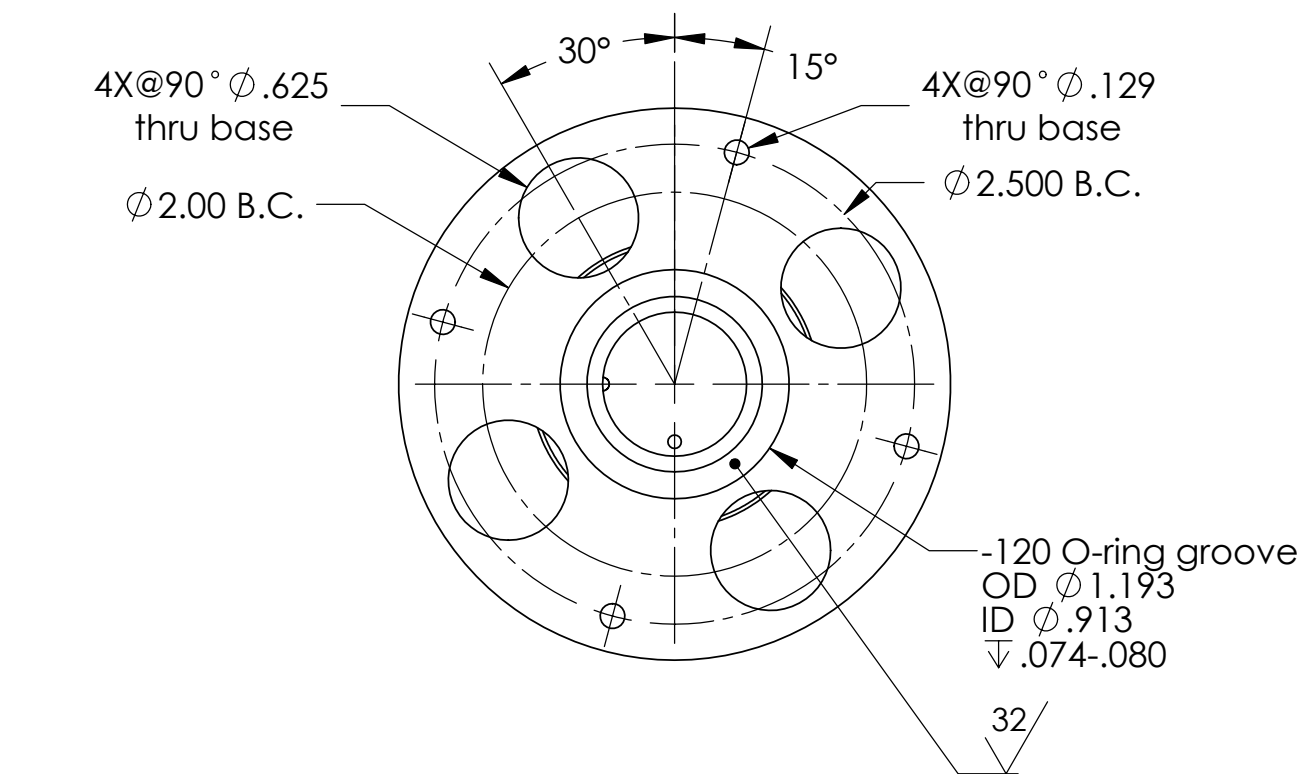


SECTION D-D



# Low Volume Flowcell (2.4 ml)

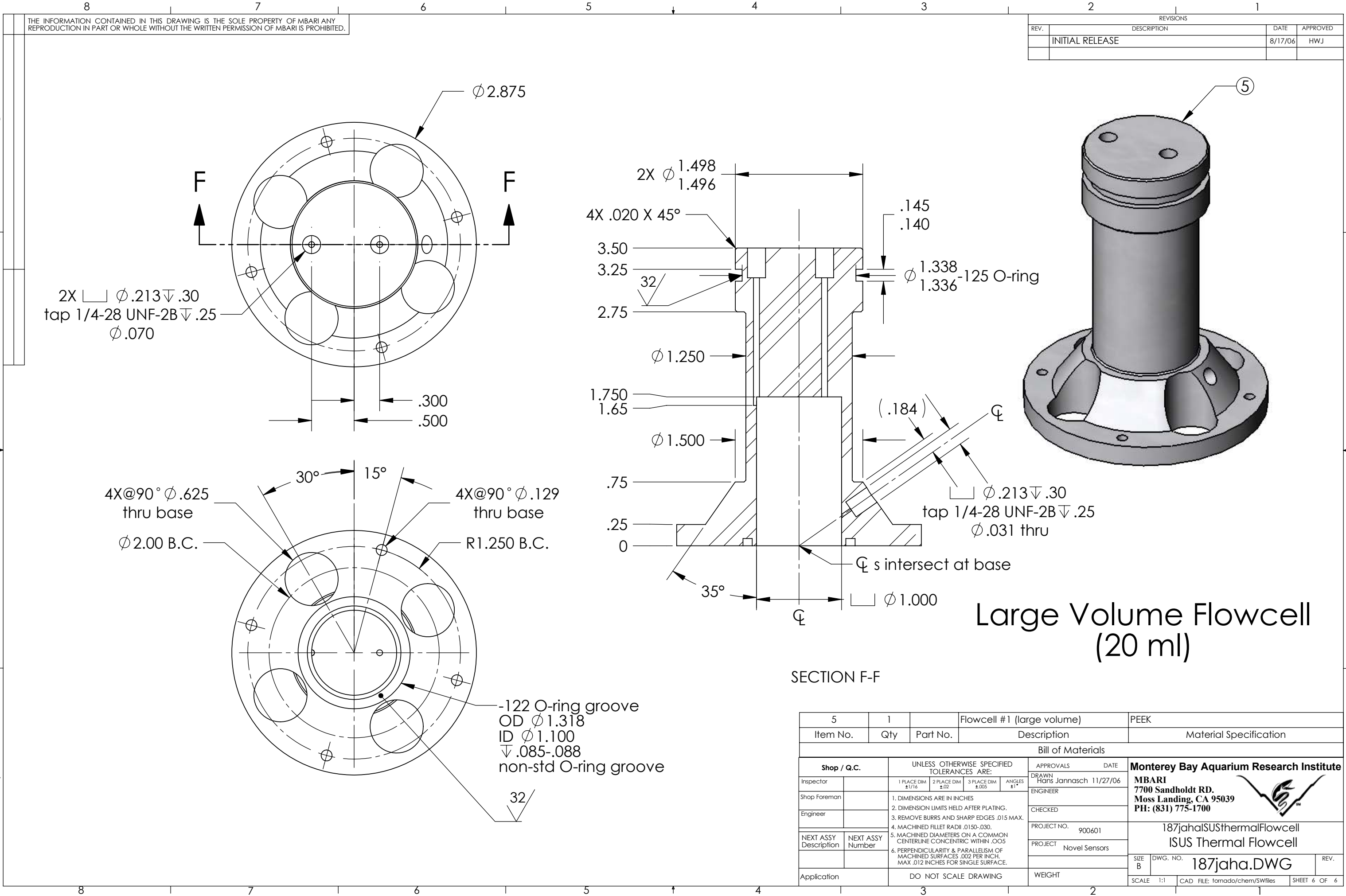
|                       |                  |                                                                                                                                                                                                                                                                                                                                                 |                  |                          |            |                                                                             |                                |              |
|-----------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------------------|------------|-----------------------------------------------------------------------------|--------------------------------|--------------|
| 3                     |                  | 1                                                                                                                                                                                                                                                                                                                                               |                  | Flowcell #1 (low volume) |            | PEEK                                                                        |                                |              |
| Item No.              |                  | Qty                                                                                                                                                                                                                                                                                                                                             | Part No.         | Description              |            | Material Specification                                                      |                                |              |
| Bill of Materials     |                  |                                                                                                                                                                                                                                                                                                                                                 |                  |                          |            |                                                                             |                                |              |
| Shop / Q.C.           |                  | UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:                                                                                                                                                                                                                                                                                                      |                  |                          | APPROVALS  |                                                                             | DATE                           |              |
| Inspector             |                  | 1 PLACE DIM ±1/16                                                                                                                                                                                                                                                                                                                               | 2 PLACE DIM ±.02 | 3 PLACE DIM ±.005        | ANGLES ±1° | DRAWN<br>Hans Jannasch 11/27/06                                             |                                |              |
| Shop Foreman          |                  | 1. DIMENSIONS ARE IN INCHES<br>2. DIMENSION LIMITS HELD AFTER PLATING.<br>3. REMOVE BURRS AND SHARP EDGES .015 MAX.<br>4. MACHINED FILLET RADII .0150-.030.<br>5. MACHINED DIAMETERS ON A COMMON CENTERLINE CONCENTRIC WITHIN .005<br>6. PERPENDICULARITY & PARALLELISM OF MACHINED SURFACES .002 PER INCH. MAX .012 INCHES FOR SINGLE SURFACE. |                  |                          |            | ENGINEER                                                                    |                                |              |
| Engineer              |                  |                                                                                                                                                                                                                                                                                                                                                 |                  |                          |            | CHECKED                                                                     |                                |              |
|                       |                  |                                                                                                                                                                                                                                                                                                                                                 |                  |                          |            | PROJECT NO. 900601                                                          |                                |              |
| NEXT ASSY Description | NEXT ASSY Number |                                                                                                                                                                                                                                                                                                                                                 |                  |                          |            | PROJECT Novel Sensors                                                       |                                |              |
| Application           |                  | DO NOT SCALE DRAWING                                                                                                                                                                                                                                                                                                                            |                  |                          | WEIGHT     |                                                                             |                                |              |
|                       |                  |                                                                                                                                                                                                                                                                                                                                                 |                  |                          |            | Monterey Bay Aquarium Research Institute                                    |                                |              |
|                       |                  |                                                                                                                                                                                                                                                                                                                                                 |                  |                          |            | MBARI<br>7700 Sandholdt RD.<br>Moss Landing, CA 95039<br>PH: (831) 775-1700 |                                |              |
|                       |                  |                                                                                                                                                                                                                                                                                                                                                 |                  |                          |            | 187jahaISUSthermalFlowcell                                                  |                                |              |
|                       |                  |                                                                                                                                                                                                                                                                                                                                                 |                  |                          |            | ISUS Thermal Flowcell                                                       |                                |              |
|                       |                  |                                                                                                                                                                                                                                                                                                                                                 |                  |                          |            | SIZE B                                                                      | DWG. NO. 187jaha.DWG           | REV.         |
|                       |                  |                                                                                                                                                                                                                                                                                                                                                 |                  |                          |            | SCALE 1:1                                                                   | CAD FILE: tornado/chem/SWfiles | SHEET 4 OF 6 |



## Mixing Flowcell (15 ml)

## SECTION E-E

|                       |                  |                                                                                                                                                                                   |                                            |                                                                                                                                                                                                                          |
|-----------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4                     | 1                |                                                                                                                                                                                   | Flowcell #2 (with mixer)                   | PEEK                                                                                                                                                                                                                     |
| Item No.              | Qty              | Part No.                                                                                                                                                                          | Description                                | Material Specification                                                                                                                                                                                                   |
| Bill of Materials     |                  |                                                                                                                                                                                   |                                            |                                                                                                                                                                                                                          |
| Shop / Q.C.           |                  |                                                                                                                                                                                   | UNLESS OTHERWISE SPECIFIED TOLERANCES ARE: | <div> <div> APPROVALS DATE </div> <div> DRAWN<br/>Hans Jannasch 11/27/06 </div> <div> ENGINEER </div> <div> CHECKED </div> <div> PROJECT NO. 900601 </div> <div> PROJECT Novel Sensors </div> <div> WEIGHT </div> </div> |
| Inspector             |                  | 1 PLACE DIM ±.1/16                                                                                                                                                                | 2 PLACE DIM ±.02                           | 3 PLACE DIM ±.005                                                                                                                                                                                                        |
| Shop Foreman          |                  | 1. DIMENSIONS ARE IN INCHES<br>2. DIMENSION LIMITS HELD AFTER PLATING.<br>3. REMOVE BURRS AND SHARP EDGES .015 MAX.<br>4. MACHINED FILET RADII .0150-.030.                        |                                            |                                                                                                                                                                                                                          |
| Engineer              |                  | 5. MACHINED DIAMETERS ON A COMMON CENTERLINE CONCENTRIC WITHIN .005<br>6. PERPENDICULARITY & PARALLELISM OF MACHINED SURFACES .002 PER INCH. MAX. .012 INCHES FOR SINGLE SURFACE. |                                            |                                                                                                                                                                                                                          |
| NEXT ASSY Description | NEXT ASSY Number |                                                                                                                                                                                   |                                            |                                                                                                                                                                                                                          |
| Application           |                  | DO NOT SCALE DRAWING                                                                                                                                                              |                                            | <div> SIZE B DWG. NO. </div> <div> 187jaha.DWG </div> <div> SCALE 1:1 CAD FILE: tornado/chem/SWfiles SHEET 5 OF 6 </div>                                                                                                 |



Large Volume Flowcell  
(20 ml)

|                       |  |                                                                                                                                                                                                                                                                                                                                                 |  |                     |  |                                 |  |                                                                                                                                                                                                                                                     |  |
|-----------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------|--|---------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 5                     |  | 1                                                                                                                                                                                                                                                                                                                                               |  |                     |  | Flowcell #1 (large volume)      |  | PEEK                                                                                                                                                                                                                                                |  |
| Item No.              |  | Qty                                                                                                                                                                                                                                                                                                                                             |  | Part No.            |  | Description                     |  | Material Specification                                                                                                                                                                                                                              |  |
| Bill of Materials     |  |                                                                                                                                                                                                                                                                                                                                                 |  |                     |  |                                 |  |                                                                                                                                                                                                                                                     |  |
| Shop / Q.C.           |  | UNLESS OTHERWISE SPECIFIED TOLERANCES ARE:                                                                                                                                                                                                                                                                                                      |  |                     |  | APPROVALS                       |  | DATE                                                                                                                                                                                                                                                |  |
| Inspector             |  | 1 PLACE DIM<br>±1/16                                                                                                                                                                                                                                                                                                                            |  | 2 PLACE DIM<br>±.02 |  | 3 PLACE DIM<br>±.005            |  | ANGLES<br>±1°                                                                                                                                                                                                                                       |  |
| Shop Foreman          |  | 1. DIMENSIONS ARE IN INCHES<br>2. DIMENSION LIMITS HELD AFTER PLATING.<br>3. REMOVE BURRS AND SHARP EDGES .015 MAX.<br>4. MACHINED FILLET RADII .0150-.030.<br>5. MACHINED DIAMETERS ON A COMMON CENTERLINE CONCENTRIC WITHIN .005<br>6. PERPENDICULARITY & PARALLELISM OF MACHINED SURFACES .002 PER INCH. MAX .012 INCHES FOR SINGLE SURFACE. |  |                     |  | DRAWN<br>Hans Jannasch 11/27/06 |  | <b>Monterey Bay Aquarium Research Institute</b><br><b>MBARI</b><br><b>7700 Sandholdt RD.</b><br><b>Moss Landing, CA 95039</b><br><b>PH: (831) 775-1700</b><br> |  |
| Engineer              |  |                                                                                                                                                                                                                                                                                                                                                 |  |                     |  | ENGINEER                        |  |                                                                                                                                                                                                                                                     |  |
|                       |  |                                                                                                                                                                                                                                                                                                                                                 |  |                     |  | CHECKED                         |  |                                                                                                                                                                                                                                                     |  |
| NEXT ASSY Description |  | NEXT ASSY Number                                                                                                                                                                                                                                                                                                                                |  |                     |  | PROJECT NO.                     |  | 900601                                                                                                                                                                                                                                              |  |
|                       |  |                                                                                                                                                                                                                                                                                                                                                 |  |                     |  | PROJECT                         |  | Novel Sensors                                                                                                                                                                                                                                       |  |
| Application           |  | DO NOT SCALE DRAWING                                                                                                                                                                                                                                                                                                                            |  |                     |  | WEIGHT                          |  |                                                                                                                                                                                                                                                     |  |
|                       |  |                                                                                                                                                                                                                                                                                                                                                 |  |                     |  | SIZE<br>B                       |  | DWG. NO.<br><b>187jaha.DWG</b>                                                                                                                                                                                                                      |  |
|                       |  |                                                                                                                                                                                                                                                                                                                                                 |  |                     |  | SCALE 1:1                       |  | CAD FILE: tornado/chem/SWfiles                                                                                                                                                                                                                      |  |
|                       |  |                                                                                                                                                                                                                                                                                                                                                 |  |                     |  |                                 |  | REV.<br>SHEET 6 OF 6                                                                                                                                                                                                                                |  |

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PH: (831) 775-1700

187jahaISUSthermalFlowcell  
ISUS Thermal Flowcell

SIZE B DWG. NO. 187jaha.DWG REV.